

Not Recommended for New Design



AP1346/1347

Two Coil Fan Motor Predriver

■ Features

- Compatible to a Hall element
- Operating voltage (V_{CC}) : 4V to 28V
- Lock shutdown and automatic restart
- Rotation detection (RD) output name as AP1347
- Speed indication output (FG) named as AP1346
- Output current $I_O=70\text{mA}_{(\text{max})}$
- Operating temperature (T_{opr}) : -30°C to +85°C
- SOP8 package
- Include Thermal Shutdown circuit

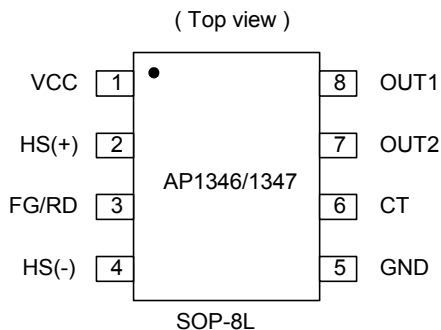
■ Application

- High voltage, high current brushless DC fan

■ General Description

The AP1346/7 fan motor predriver is suited for two-coil brush-less DC fan. All functions, including lock shutdown, automatic restart, speed indication (FG), have been integrated into one chip. When the motor is under lock condition, lock shutdown function turns off the output. When the lock condition is removed, the IC automatically restarts and allows DC fan to run. In addition, the FG function is to indicate the rotation speed and the RD function is to detect the motor status.

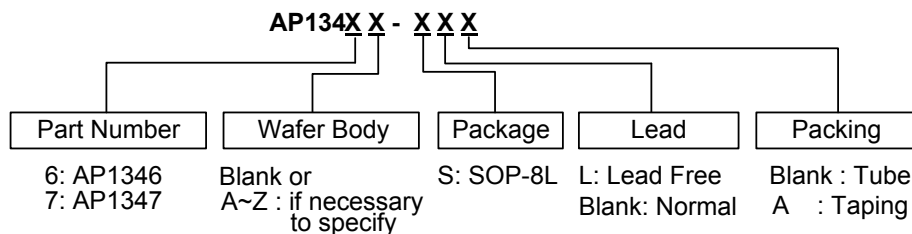
■ Pin Assignment



■ Pin Descriptions

Name	Description
VCC	Power input
HS(+)	Hall input
FG /RD	Speed indication / Rotation detection
HS(-)	Hall input
GND	Ground
CT	Timing capacitor
OUT2	Driver output
OUT1	Driver output

■ Ordering Information



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The block diagram illustrates the system architecture and pin connections. The components and their interconnections are as follows:

- VCC (Pin 1)**: Connected to the power supply, the Reg. block, and the Predriver 1 and Predriver 2 blocks.
- Reg.**: A voltage regulator that receives VCC and provides a regulated output to the Control Logic.
- HS(+) (Pin 2)**: Connected to the non-inverting input (+) of the Hall amp.
- HS(-) (Pin 4)**: Connected to the inverting input (-) of the Hall amp.
- Hall amp**: A differential amplifier that outputs a signal to the Control Logic.
- Control Logic**: The central processing unit that receives inputs from the Reg., Hall amp, and FG/RD, and controls the Predriver 1, Predriver 2, Lock Detection, and Automatic Restart blocks.
- FG/RD (Pin 3)**: Connected to the input of the Lock Detection block.
- Lock Detection**: A block that monitors the FG/RD signal and provides feedback to the Automatic Restart block.
- Automatic Restart**: A block that manages the restart sequence, receiving inputs from the Control Logic and Lock Detection, and controlling the Predriver 1 and Predriver 2 blocks.
- Predriver 1**: Receives VCC and control signals from the Control Logic and Automatic Restart, driving the motor through OUT1 (Pin 8).
- Predriver 2**: Receives VCC and control signals from the Control Logic and Automatic Restart, driving the motor through OUT2 (Pin 7).
- CT (Pin 6)**: A common terminal connected to the motor windings and the CT pin.
- GND (Pin 5)**: The ground reference for the system, connected to the motor windings and the GND pin.

The diagram shows a Hall-effect-based current sensor circuit. A voltage input is connected to a capacitor C1 and a diode D1. The output of D1 is connected to the VCC pin of the AP1346/AP1347 IC. A diode D2 is connected in parallel with the input line. The HS(+) pin of the IC is connected to a Hall element, which is also connected to a resistor R2 to ground. The HS(-) pin is connected to the other side of the Hall element and to a capacitor C2 to ground. The CT pin is connected to ground. The FG/RD pin is connected to an output buffer consisting of a resistor R6 and a buffer IC (represented by a triangle symbol). The OUT1 pin is connected to a resistor R4 and the base of a transistor Q1. The OUT2 pin is connected to a resistor R5 and the base of a transistor Q2. The emitters of Q1 and Q2 are connected to ground. The collectors of Q1 and Q2 are connected to inductors L1 and L2, respectively. The other ends of L1 and L2 are connected to a common output line. Zener diodes Z11 and Z1N are connected in parallel with the output line to ground. Zener diodes Z21 and Z2N are connected in parallel with the output line to ground.

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■ Absolute Maximum Ratings (T_A=25°C)

Parameter	Symbol	Rating	Unit
Input voltage	V _{CC}	30	V
Output current	I _{OUT}	70	mA
Allowable power dissipation	P _D	550*(note1)	mW
Operating temperature	T _{OPR}	-30 to +85	°C
Storage temperature	T _{STG}	-55 to +125	°C

*note1 : Reduced by 5.5mW for each increase in Ta of 1°C over 25 °C

■ Electrical Characteristics (T_A=25°C, V_{CC}=12V, unless otherwise noted)

Parameter	Symbol	Conditions	Rating			Unit
			Min.	Typ.	Max.	
Input voltage	V _{IN}		4	--	28	V
Hall input voltage (DC+AC)	V _{BH}	Includes the amplitude of signal	1	--	V _{CC} -0.5	V
Supply current	I _{CC}	The output is off	--	4	5.5	mA
Hall amp input hysteresis (+)	V _{HYS+}	Delta V when V _{BH} =6V	3	--	15	mV
Hall amp input hysteresis (-)	V _{HYS-}	Delta V when V _{BH} =6V	-15	--	-3	mV
Charge current	I _{CHG}	V _{CT} = 1.5V	7.7	9.6	11.5	uA
Discharge current	I _{DHG}	V _{CT} = 1.5V	0.19	0.24	0.29	uA
Charge/discharge ratio	R _{CD}	I _{CHG} /I _{DCHG}	32	40	48	--
Clamp voltage	V _{CL}		1.6	2.0	2.4	V
Comparator voltage	V _{CP}		0.8	1.0	1.2	V
Output high level	V _{OH}	I _O = 10mA	10	10.5	--	V
FG / RD pin output low	V _{FGL} / V _{RDL}	I _{FG} = 5mA / I _{RD} = 5mA	--	--	0.5	V
FG / RD pin sink current capacity	I _{FG} / I _{RD}	V _{FGL} = 2V / V _{RDL} = 2V	8	--	--	mA

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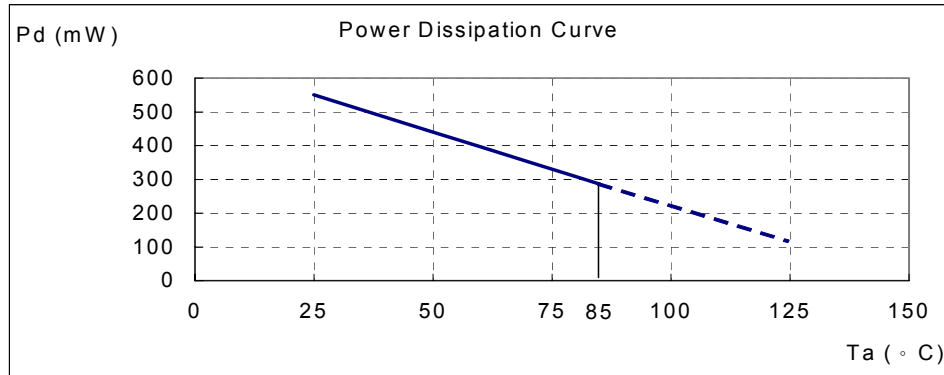


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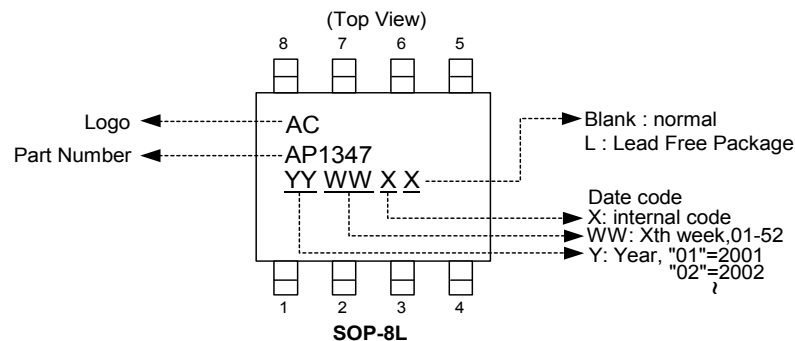
■ Performance Characteristics

Ta (°C)	25	50	60	70	80	85	90
Pd (mW)	550	440	396	352	308	286	264
Ta (°C)	95	100	105	110	115	120	125
Pd (mW)	242	220	198	176	154	132	110



Note : SOP-8L package.

■ Marking Information



Note: For AP1346, part number is marked as AP1346.

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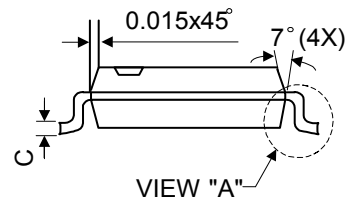
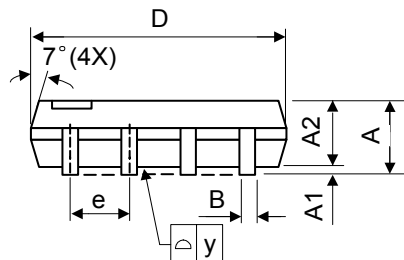
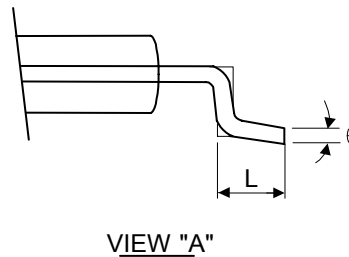
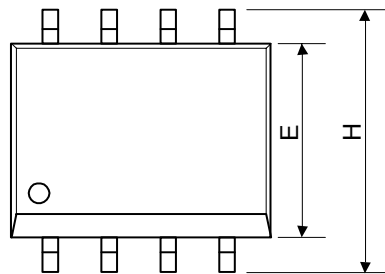


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■ Package Information

Package Type: SOP-8L



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	1.40	1.60	1.75	0.055	0.063	0.069
A1	0.10	-	0.25	0.040	-	0.100
A2	1.30	1.45	1.50	0.051	0.057	0.059
B	0.33	0.41	0.51	0.013	0.016	0.020
C	0.19	0.20	0.25	0.0075	0.008	0.010
D	4.80	5.05	5.30	0.189	0.199	0.209
E	3.70	3.90	4.10	0.146	0.154	0.161
e	-	1.27	-	-	0.050	-
H	5.79	5.99	6.20	0.228	0.236	0.244
L	0.38	0.71	1.27	0.015	0.028	0.050
y	-	-	0.10	-	-	0.004
θ	0°	-	8°	0°	-	8°